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WO 02/058699 A1

(54) Title: PHARMACEUTICAL FORMS OF EPOTHILONES FOR ORAL ADMINISTRATION

(57) Abstract: The invention relates to methods of increasing the bioavailability of orally administered epothilones. Epothilones administered by the methods of the invention are sufficiently bioavailable to have a pharmacological effect. The invention further relates to pharmaceutical compositions, pharmaceutical dosage forms, and kits for use in the methods of the invention.

Table 5. Summary of Pharmacokinetics of Patients Administered Compound A Orally and Intravenously

Dose (mg/m^2)	20		25		30	
N	3		11		4	
Route	IV	Oral	IV	Oral	IV	Oral
Formulation	IV	Solution for Oral Admin.	IV	Solution for Oral Admin.	IV	Solution for Oral Admin.
CMAX[a] (ng/mL)	251 (108)	142 (106)	447 (189)	180 (110)	711 (530)	274 (104)
TMAX[b] (h)	0.25 (0.25, 0.25)	1.0 (0.25, 1.50)	0.50 (0.25, 050)	0.50 (0.25, 3.00)	0.50 (0.25, 0.50)	0.50 (0.25, 0.75)
AUC(0-T)[a,c] (h.ng/mL)	796 (587)	404 (381)	848 (284)	533 (284)	1155 (292)	708 (291)
%F[a]	NA	43.5 (16.1)	NA	55.6 (18.4)	NA	62.2 (25.1)

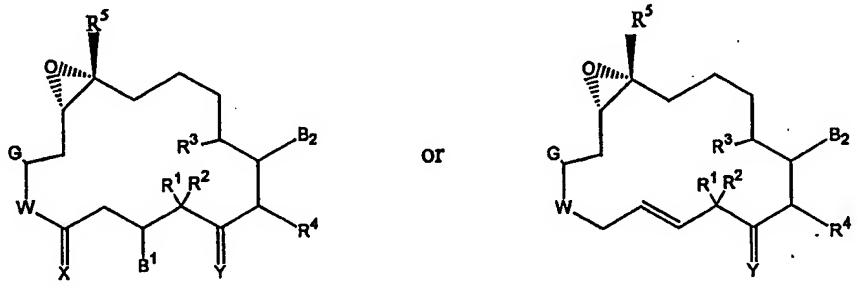
[a]Mean(SD)
[b]Median (min, max)
[c]Represents AUC(0-T)

The embodiments of the invention described above are intended to be merely exemplary, and those skilled in the art will recognize, or will be able to ascertain using no more than routine experimentation, numerous equivalents of specific compounds, materials, and procedures. All such equivalents are considered to be within the scope of the invention and are encompassed by the appended claims.

The Claims

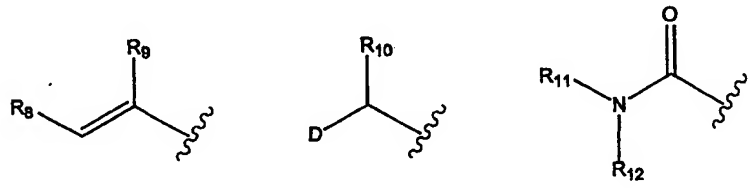
What is claimed is:

1. A method of increasing the bioavailability of orally administered epothilones comprising orally administering to a human one or more epothilones of Formula:



wherein:

G is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, heterocyclo,



(a) (b) (c)

W is O or NR_{16};

X is O; S; CHR_{17}; or H, R_{18};

Y is selected from the group consisting of O; H, H; H, OR_{22}; OR_{23}, OR_{23}; NOR_{24}; H, NOR_{25}; H, $HNR_{26}R_{27}$; $NHNR_{28}R_{29}$; H, $NHNR_{30}R_{31}$ or CHR_{32}, where OR_{23}, OR_{23} can be a cyclic ketal;

B_1 and B_2 are selected from the group consisting of H, OR_{33}, $OCOR_{34}$, $OCONR_{35}R_{36}$, $NR_{37}R_{38}$, or $NR_{39}CONR_{40}R_{41}$;

D is selected from the group consisting of $NR_{42}R_{43}$ or heterocyclo;

R_1, R_2, R_3, R_4, and R_5 are selected from H, lower alkyl;

R_8, R_9, R_{10} and R_{11} are selected from the group consisting of H, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl, heterocyclo or substituted heterocyclo;

R_{17}, R_{18}, R_{22}, and R_{23} are selected from the group consisting of H, alkyl, and substituted alkyl;

R_{24}, R_{25}, R_{26}, R_{28}, R_{30}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{39}, R_{40}, R_{41}, R_{42}, R_{51}, R_{52}, R_{53}, and R_{61} are selected from the group of H, alkyl, substituted alkyl, aryl or substituted aryl;

R_{12}, R_{16}, R_{27}, R_{29}, R_{31}, R_{38}, and R_{43}, are selected from the group consisting of H, alkyl, substituted alkyl, substituted aryl, cycloalkyl, heterocyclo, $R_{51}C{=}O$, $R_{52}OC{=}O$, $R_{53}SO_2$, hydroxy, and O-alkyl or O-substituted alkyl,

or a pharmaceutically acceptable salt, solvate, clathrate, hydrate or prodrug thereof, and orally administering one or more pharmaceutically acceptable acid neutralizing buffers.

2. The method of claim 1, wherein the pharmaceutically acceptable acid neutralizing buffer is administered concurrently with the epothilone.

3. The method of claim 1, wherein the pharmaceutically acceptable acid neutralizing buffer is administered before the epothilone.

4. The method of claim 3, wherein the pharmaceutically acceptable acid neutralizing buffer is administered not more than about 1 hour before the epothilone.

5. The method of claim 1, wherein the pharmaceutically acceptable acid neutralizing buffer is administered after the epothilone.

6. The method of claim 5, wherein the pharmaceutically acceptable acid neutralizing buffer is administered not more than about 1 hour after the epothilone.

7. The method of claim 1, wherein the pharmaceutically acceptable acid neutralizing buffer is administered before and after the epothilone.

8. The method of claim 7, wherein the pharmaceutically acceptable acid neutralizing buffer is administered not more than about 1 hour before and not more than about 1 hour after the epothilone is administered.

9. The method of claim 1, wherein the pharmaceutically acceptable acid neutralizing buffer is administered in an amount sufficient to deliver at least about 20 milliequivalents of acid neutralization capacity.

10. The method of claim 1, wherein the pharmaceutically acceptable acid neutralizing buffer is administered as an aqueous solution having a pH of between about 5 to 9.

11. The method of claim 1, wherein the pharmaceutically acceptable acid neutralizing buffer is administered as an aqueous solution comprising anhydrous dibasic sodium phosphate, sodium citrate dihydrate, and anhydrous citric acid.

12. The method of claim 11, wherein the pH of the aqueous solution is about 7.

13. The method of claim 1, wherein the bioavailability of the one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof is at least about 20 percent.

14. The method of claim 1, wherein the one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof is orally administered as a solution in propylene glycol and ethanol, wherein the in ratio of propylene glycol:ethanol is about 80:20.

15. The method of claim 1, wherein the one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof is administered in a total amount of about 0.05 to about 200 mg/kg/day.

16. The method of claim 15, wherein the one or more epothilones of or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof is administered in about 2 to 4 divided doses.

17. The method of claim 1, wherein the epothilone is [1S-[1R*, 3R*(E), 7R*, 10S*, 11R*, 16S*]]-7, 11-dihydroxy 8, 8,10,12,16-pentamethyl-3-[1-methyl-2-(2-methyl-4-thiazolyl)ethenyl-17-oxa-4-azabicyclo[14.1.0]heptadecane-5, 9-dione.

18. The method of claim 1 comprising:

(a) orally administering an aqueous solution of a pharmaceutically acceptable acid neutralizing buffer comprising anhydrous dibasic sodium phosphate, sodium citrate dihydrate, and anhydrous citric acid;

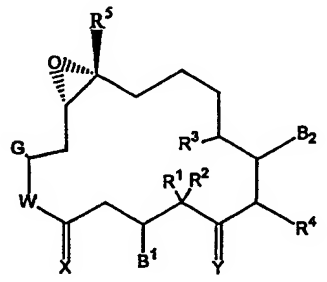
(b) orally administering the one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof as a solution of propylene glycol; and

(c) orally administering an aqueous solution of a pharmaceutically acceptable acid neutralizing buffer comprising anhydrous dibasic sodium phosphate, sodium citrate dihydrate, and anhydrous citric acid;.

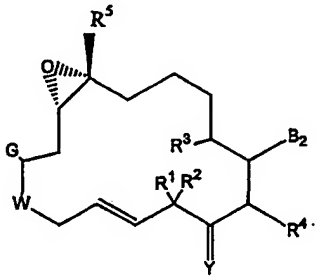
19. The method of claim 18, wherein the epothilone is [1S-[1R*, 3R*(E), 7R*, 10S*, 11R*, 16S*]]-7, 11-dihydroxy 8, 8,10,12,16-pentamethyl-3-[1-methyl-2-(2-methyl-4-thiazolyl)ethenyl-17-oxa-4-azabicyclo[14.1.0]heptadecane-5, 9-dione.

20. A kit for use in a method of increasing the biovailability of orally administered epothilones which comprises:

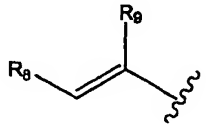
(i) a first component comprising one or more epothilones of Formula:

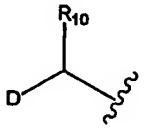


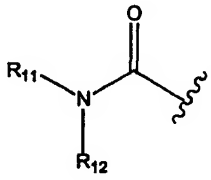
or



G is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, heterocyclo,







W is O or NR_{16};

X is O; S; CHR_{17}; or H, R_{18}

Y is selected from the group consisting of O; H, H; H, OR_{22}; OR_{23}, OR_{23}; NOR_{24}; H, NOR_{25}; H, $HNR_{26}R_{27}$; $NHNR_{28}R_{29}$; H, $NHNR_{30}R_{31}$ or CHR_{32}, where OR_{23}, OR_{23} can be a cyclic ketal;

B_1 and B_2 are selected from the group consisting of H, OR_{33}, $OCOR_{34}$, $OCONR_{35}R_{36}$, $NR_{37}R_{38}$, or $NR_{39}CONR_{40}R_{41}$

D is selected from the group consisting of $NR_{42}R_{43}$ or heterocyclo;

R_1, R_2, R_3, R_4, and R_5 are selected from H, lower alkyl;

R_8, R_9, R_{10} and R_{11} are selected from the group consisting of H, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl, heterocyclo or substituted heterocyclo;

R_{17}, R_{18}, R_{22}, and R_{23} are selected from the group consisting of H, alkyl, and substituted alkyl;

R_{24}, R_{25}, R_{26}, R_{28}, R_{30}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{39}, R_{40}, R_{41}, R_{42}, R_{51}, R_{52}, R_{53}, and R_{61} are selected from the group of H, alkyl, substituted alkyl, aryl or substituted aryl;

R_{12}, R_{16}, R_{27}, R_{29}, R_{31}, R_{38}, and R_{43}, are selected from the group consisting of H, alkyl, substituted alkyl, substituted aryl, cycloalkyl, heterocyclo, $R_{51}C{=}O$, $R_{52}OC{=}O$, $R_{53}SO_2$, hydroxy, and O-alkyl or O-substituted alkyl; or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof; and

(ii) a second component comprising a pharmaceutically acceptable acid neutralizing buffer,

wherein the first component and the second component are provided as an oral dosage form or as a pharmaceutical composition that can be reconstituted with a solvent to provide a liquid oral dosage.

21. The kit of claim 20, wherein at least one of the first component or the second component is provided as a solid oral dosage form.

22. The kit of claim 21, wherein at least one of the first component or the second component is anhydrous.

23. The kit of claim 20, wherein at least one of the first component or the second component is provided as a pharmaceutical composition that can be reconstituted with a solvent to provide a liquid oral dosage form.

24. The kit of claim 23, wherein at least one of the first component or the second component is provided as a tablet.

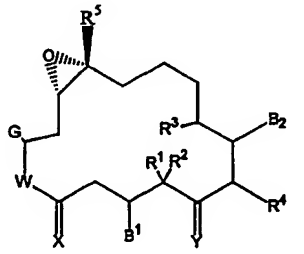
25. The kit of claim 23, wherein at least one of the first component or the second component is anhydrous.

26. The kit of claim 23, further comprising solvents for reconstituting the first or second components.

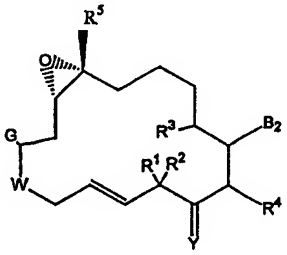
27. The kit of claim 26, wherein the solvent for reconstituting the first component is a mixture of propylene glycol and ethanol.

28. A pharmaceutical composition suitable for oral administration to a mammal comprising:

(i) one or more epothilones of Formula:

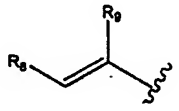


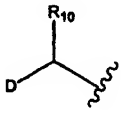
or

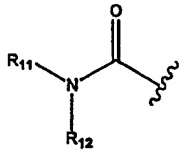


wherein:

G is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, heterocyclo,







W is O or NR^{16};

X is O; S; CHR_{17}; or H, R_{18};

Y is selected from the group consisting of O; H, H; H, OR_{22}; OR_{23}, OR_{23}; NOR_{24}; H, NOR_{25}; H, $HNR_{26}R_{27}$; $NHNR_{28}R_{29}$; H, $NHNR_{30}R_{31}$ or CHR_{32}, where OR_{23}, OR_{23} can be a cyclic ketal;

B_1 and B_2 are selected from the group consisting of H, OR_{33}, $OCOR_{34}$, $OCONR_{35}R_{36}$, $NR_{37}R_{38}$, or $NR_{39}CONR_{40}R_{41}$

D is selected from the group consisting of $NR_{42}R_{43}$ or heterocyclo;

R_1, R_2, R_3, R_4, and R_5 are selected from H, lower alkyl;

R_8, R_9, R_{10} and R_{11} are selected from the group consisting of H, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl, heterocyclo or substituted heterocyclo;

R_{17}, R_{18}, R_{22}, and R_{23} are selected from the group consisting of H, alkyl, and substituted alkyl;

R_{24}, R_{25}, R_{26}, R_{28}, R_{30}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{39}, R_{40}, R_{41}, R_{42}, R_{51}, R_{52}, R_{53}, and R_{61} are selected from the group of H, alkyl, substituted alkyl, aryl or substituted aryl;

R_{12}, R_{16}, R_{27}, R_{29}, R_{31}, R_{38}, and R_{43}, are selected from the group consisting of H, alkyl, substituted alkyl, substituted aryl, cycloalkyl, heterocyclo, R51C=O, $R_{52}OC=O$, $R_{53}SO_2$, hydroxy, and O-alkyl or O-substituted alkyl;

or a pharmaceutically acceptable salt, solvate, clathrate, hydrate or prodrug thereof, in solid form; and

(ii) a solid pharmaceutically acceptable acid neutralizing buffer in an amount sufficient to reduce decomposition of the one or more epothilones, or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof when the pharmaceutical composition is reconstituted with a solvent to provide a liquid oral dosage form.

29. The pharmaceutical composition of claim 28, wherein the pharmaceutically acceptable acid neutralizing buffer provides a liquid oral dosage form having a pH between about 5 to 9.

30. The pharmaceutical composition of claim 28, wherein the pharmaceutically acceptable acid neutralizing buffer is present in an amount sufficient to provide at least about 20 milliequivalents of acid neutralization capacity.

31. The pharmaceutical composition of claim 28, wherein the pharmaceutically acceptable acid neutralizing buffer is a dibasic phosphate-citric acid-citrate buffer.

32. The pharmaceutical composition of claim 28, wherein the one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof is present in an amount of between about 0.05 and 200 mg.

33. The pharmaceutical composition of claim 28, wherein the epothilone is [1S-[1R*, 3R*(E), 7R*, 10S*, 11R*, 16S*]]-7, 11-dihydroxy 8, 8,10,12,16-pentamethyl-3-[1-methyl-2-(2-methyl-4-thiazolyl)ethenyl-17-oxa-4-azabicyclo[14.1.0] heptadecane-5, 9-dione.

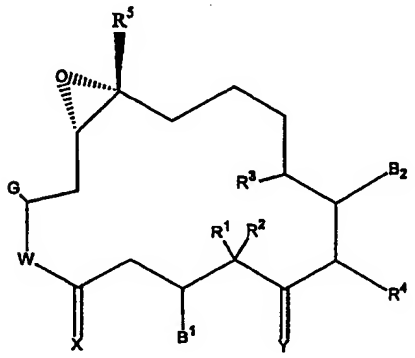
34. A kit comprising the pharmaceutical composition of claim 28 and a solvent for reconstituting the pharmaceutical composition to provide an oral dosage form.

35. The kit of claim 34, wherein the solvent comprises propylene glycol, ethanol, and phosphate buffer (1M, pH 8).

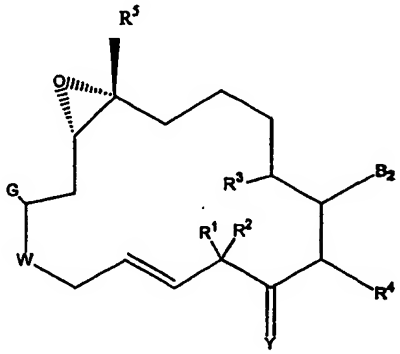
36. The kit of claim 35, wherein the ratio of propylene glycol:ethanol:phosphate buffer is about 58:12:30.

37. A liquid oral dosage form suitable for oral administration to a mammal comprising:

(i) one or more epothilones of Formula:

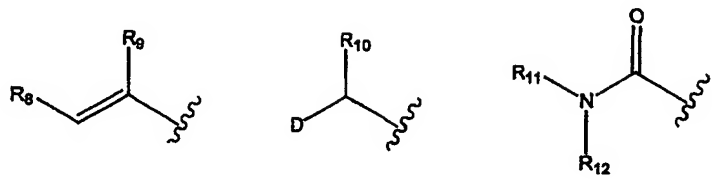


or



wherein:

G is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, heterocyclo,



W is O or NR_{16};

X is O; S; CHR_{17}; or H, R_{18};

Y is selected from the group consisting of O; H, H; H, OR_{22}; OR_{23}, OR_{23}; NOR_{24}; H, NOR_{25}; H, $HNR_{26}R_{27}$; $NHNR_{28}R_{29}$; H, $NHNR_{30}R_{31}$ or CHR_{32}, where OR_{23}, OR_{23} can be a cyclic ketal;

B_1 and B_2 are selected from the group consisting of H, OR_{33}, $OCOR_{34}$, $OCONR_{35}R_{36}$, $NR_{37}R_{38}$, or $NR_{39}CONR_{40}R_{41}$

D is selected from the group consisting of $NR_{42}R_{43}$ or heterocyclo;

R_1, R_2, R_3, R_4, and R_5 are selected from H, lower alkyl;

R8, R9, R10 and R11 are selected from the group consisting of H, alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl, heterocyclo or substituted heterocyclo;

R_{17}, R_{18}, R_{22}, and R_{23} are selected from the group consisting of H, alkyl, and substituted alkyl;

R_{24}, R_{25}, R_{26}, R_{28}, R_{30}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{39}, R_{40}, R_{41}, R_{42}, R_{51}, R_{52}, R_{53}, and R_{61} are selected from the group of H, alkyl, substituted alkyl, aryl or substituted aryl;

R_{12}, R_{16}, R_{27}, R_{29}, R_{31}, R_{38}, and R_{43}, are selected from the group consisting of H, alkyl, substituted alkyl, substituted aryl, cycloalkyl, heterocyclo, $R_{51}C{=}O$, $R_{52}OC{=}O$, $R_{53}SO_2$, hydroxy, and O-alkyl or O-substituted alkyl;

or a pharmaceutically acceptable salt, solvate, clathrate, hydrate or prodrug thereof; and

(ii) a pharmaceutically acceptable liquid carrier.

38. The liquid oral dosage form of claim 41, wherein the epothilone is [1S-[1R*, 3R*(E), 7R*, 10S*, 11R*, 16S*]]-7, 11-dihydroxy 8, 8,10,12,16-pentamethyl-3-[1-methyl-2-(2-methyl-4-thiazolyl)ethenyl-17-oxa-4-azabicyclo[14.1.0]heptadecane-5, 9-dione.

39. The liquid oral dosage form of claim 37, further comprising a pharmaceutically acceptable acid neutralizing buffer in an amount sufficient to reduce decomposition of the one or more epothilones, or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof compared to a pharmaceutical composition without the buffer.

40. The liquid oral dosage form of claim 39, wherein the pH of the liquid oral dosage form is between about 5 to 9.

41. The liquid oral dosage form of claim 39, wherein the buffer is present in an amount sufficient to provide at least about 20 milliequivalents of acid neutralization capacity.

42. The liquid oral dosage form of claim 37, wherein the solvent is propylene glycol, ethanol, and water buffered with a phosphate buffer at pH about 8.

43. The liquid oral dosage form of claim 42, wherein the propylene glycol, ethanol, and water buffered with a phosphate buffer are present in a ratio of about 58:12:30.

44. The liquid oral dosage form of claim 42, wherein the epothilone is [1S-[1R*, 3R*(E), 7R*, 10S*, 11R*, 16S*]]-7, 11-dihydroxy 8, 8,10,12,16-pentamethyl-3-[1-

methyl-2-(2-methyl-4-thiazolyl)ethenyl-17-oxa-4-azabicyclo[14.1.0]heptadecane-5, 9-dione.

45. The liquid oral dosage form of claim 37, wherein the one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof is present in an amount of between about 0.05 and 200 mg.

46. The liquid oral dosage form of claim 39, wherein the buffer is dibasic phosphate-citric acid-citrate buffer.

47. An article of manufacture which comprises:

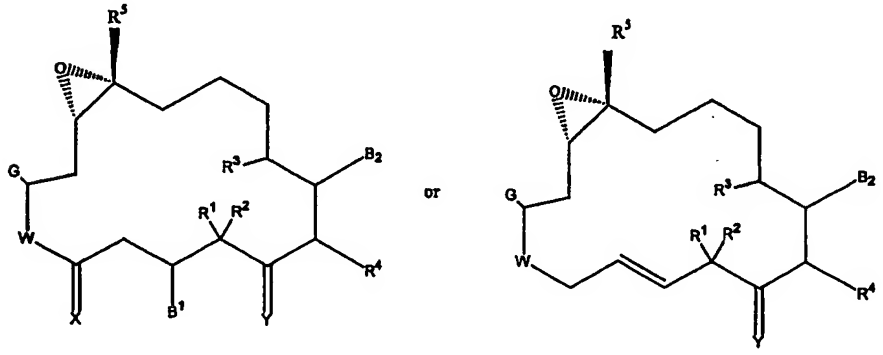
(a) a sealable container suitable to carry a liquid or solid pharmaceutical;

(b) one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate or prodrug thereof; and

(c) a pharmaceutically acceptable carrier suitable to deliver the epothilone orally

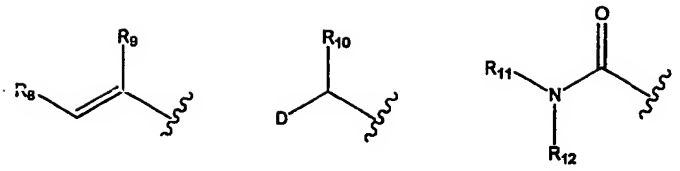
48. A dispersible buffered tablet which comprises:

(i) one or more epothilones of Formula:



wherein:

G is selected from the group consisting of alkyl, substituted alkyl, aryl, substituted aryl, heterocyclo,



W is O or NR_{16};

X is O; S; CHR_{17}; or H, R_{18};

Y is selected from the group consisting of O; H, H; H, OR_{22}; OR_{23}, OR_{23}; NOR_{24}; H, NOR_{25}; H, $HNR_{26}R_{27}$; $NHNR_{28}R_{29}$; H, $NHNR_{30}R_{31}$ or CHR_{32}, where OR_{23}, OR_{23} can be a cyclic ketal;

B_1 and B_2 are selected from the group consisting of H, OR_{33}, $OCOR_{34}$, $OCONR_{35}R_{36}$, $NR_{37}R_{38}$, or $NR_{39}CONR_{40}R_{41}$

D is selected from the group consisting of $NR_{42}R_{43}$ or heterocyclo;

R_1, R_2, R_3, R_4, and R_5 are selected from H, lower alkyl;

R_8, R_9, R_{10} and R11 are selected from the group consisting of , alkyl, substituted alkyl, aryl, substituted aryl, cycloalkyl, heterocyclo or substituted heterocyclo;

R_{17}, R_{18}, R_{22}, and R_{23} are selected from the group consisting of H, alkyl, and substituted alkyl;

R_{24}, R_{25}, R_{26}, R_{28}, R_{30}, R_{32}, R_{33}, R_{34}, R_{35}, R_{36}, R_{37}, R_{39}, R_{40}, R_{41}, R_{42}, R_{51}, R_{52}, R_{53}, and R_{61} are selected from the group of H, alkyl, substituted alkyl, aryl or substituted aryl;

R_{12}, R_{16}, R_{27}, R_{29}, R_{31}, R_{38}, and R_{43}, are selected from the group consisting of H, alkyl, substituted alkyl, substituted aryl, cycloalkyl, heterocyclo, R51C=O, R_{52}OC=O, R_{53}SO2, hydroxy, and O-alkyl or O-substituted alkyl;

or a pharmaceutically acceptable salt, solvate, clathrate, hydrate or prodrug thereof; and

(ii) buffer components which are suitable to neutralize gastric fluids for a time sufficient to allow said epothilone to be absorbed.

49. The kit of claim 20, wherein the first and second component is provided as a liquid oral dosage form.

50. The kit of claim 49, wherein the one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof is present in an amount of between about 0.05 and 200 mg and the pharmaceutically acceptable acid neutralizing buffer is present in an amount sufficient to provide at least about 20 milliequivalents of acid neutralization capacity.

51. The kit of claim 20, wherein the first component and the second component is provided as a pharmaceutical composition that can be reconstituted with a solvent to provide a liquid oral dosage form; the one or more epothilones or a pharmaceutically acceptable salt, solvate, clathrate, hydrate, or prodrug thereof is present as a in an amount of between about 0.05 and 200 mg; and the pharmaceutically acceptable acid neutralizing buffer is present in an amount sufficient to provide at least about 20 milliequivalents of acid neutralization capacity.

52. The kit of claim 20, wherein the epothilone is [1S-[1R*, 3R*(E), 7R*, 10S*, 11R*, 16S*]]-7, 11-dihydroxy 8, 8,10,12,16-pentamethyl-3-[1-methyl-2-(2-methyl-4-thiazolyl)ethenyl-17-oxa-4-azabicyclo[14.1.0]heptadecane-5, 9-dione and the pharmaceutically acceptable acid neutralizing buffer comprises dibasic sodium phosphate, sodium citrate, and anhydrous citric acid.

INTERNATIONAL SEARCH REPORT

PCT/US 02/01693

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K31/425 A61K47/12 A61K47/02 A61P35/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, CHEM ABS Data, MEDLINE, EMBASE, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 43320 A (NOVARTIS ERFIND VERWALT GMBH ;NOVARTIS AG (CH)) 2 September 1999 (1999-09-02) abstract page 31, line 31 -page 32, line 28 page 33, line 11 - line 21 claims 1-52	1-52
A	WO 99 01124 A (SLOAN KETTERING INST CANCER) 14 January 1999 (1999-01-14) abstract page 1, line 37 - line 45 claims 1-58	1-52

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 July 2002	10/07/2002

Name and mailing address of the ISA	Authorized officer
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INTERNATIONAL SEARCH REPORT

PCT/US 02/01693

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9943320 A	02-09-1999	AU 2927999 A	15-09-1999
		BE 1011980 A5	07-03-2000
		CA 2319752 A1	02-09-1999
		WO 9943320 A1	02-09-1999
		EP 1056453 A1	06-12-2000
		FR 2775187 A1	27-08-1999
		IT MI990375 A1	25-08-1999
		JP 2002504511 T	12-02-2002
		US 6302838 B1	16-10-2001
		US 2002028839 A1	07-03-2002
WO 9901124 A	14-01-1999	AU 5792998 A	25-01-1999
		EP 0977563 A1	09-02-2000
		JP 2001507716 T	12-06-2001
		WO 9901124 A1	14-01-1999
		US 6204388 B1	20-03-2001
		US 6316630 B1	13-11-2001
		US 6300355 B1	09-10-2001
		US 6369234 B1	09-04-2002
		US 6284781 B1	04-09-2001
		US 2002002194 A1	03-01-2002
		US 6242469 B1	05-06-2001
		ZA 9711282 A	09-02-1999